MULTI-FUNCTION INPUT / OUTPUT EXPANDER
UMX-4, UMX-8

DESCRIPTION

The **Kele UMX-8** is a unique microcomputer-based multifunction interface that expands the input or output capability of building automation controllers. It has eight SPDT output relays that provide on/off control from a jumper-selectable PWM, current or voltage input signal. The sequence of operation can be easily selected by DIP switches. A dual mode allows two UMX-8s to be controlled in sequence from a single input signal. HOA switches allow for manual override of each relay output. Feedback and LEDs provide status indication of the UMX-8.The UMX-4 provides four SPDT output relays. All jumper positions and DIP switch settings are identical to the **UMX-8**. The operation of the **UMX-4** is identical to relays 1-4 on the **UMX-8**. Feedback and LEDs provide status indication of the **UMX-4**.

RoHS

UMX-4

UMX-8

STANDARD CONTROL SEQUENCE FUNCTIONS

Multiplexed Relay Output Expander - Provides up to 16 relay outputs expansion from one BAS output
Multiplexed Input Expander - Provides up to 16 inputs expansion from one BAS output and one BAS input
RTU or AHU Controller - Provides multistage heating and cooling sequences with economizer
Sequencer - Up to 16 stages of sequential control
Custom Sequences - Consult Kele for details

APPLICATION

The **UMX** is recommended for use only with BAS controllers programmable to issue discrete PWM, current, or voltage signal commands. For sequential relay control from a varying analog current or voltage signal, use a UCS sequencer module.

FEATURES

- **Four or eight SPDT relay outputs**
- **HOA switches**
- **LED status indication**
- **Field-selectable functions**
- **Output status feedback**
- **Override indication**
- **Field-selectable PWM, current, or voltage inputs**
- **Pull-apart terminal blocks**

SPECIFICATIONS

Supply Voltage	24 VAC ±10%, half-wave; or 24 VDC ±10%	**Feedback**	
Supply Current		UMX-4	One output, 1-5V (3 mA) for relays 1-4
UMX-4	210 mA @ 24 VAC; 90 mA @ 24 VDC maximum	UMX-8	Two outputs, 1-5V (3 mA) for relays 1-4 and for relays 5-8
UMX-8	350 mA @ 24 VAC; 150 mA @ 24 VDC maximum	**Relay Output**	5A @ 24 VAC/VDC
Input	PWM, 0-20 mA, 0-5V, 0-10V, 0-15V, jumper selectable	**Wiring Terminations**	Screw terminals
Input Impedance	250Ω (mA input) maximum; 46.4 kΩ minimum (VDC input)	**Operating Temperature**	32° to 158°F (0° to 70°C)
		Operating Humidity	5% to 95% RH (non-condensing)
Output		**Dimensions**	3.3"H x 7.0"W x 1.6"D (8.3 x 17.8 x 4.0 cm)
UMX-4	Four SPDT relays	**Weight**	
UMX-8	Eight SPDT relays	UMX-4	0.8 lb (0.4 kg)
Override	Transistor switch, 30 VDC @ 100 mA maximum	UMX-8	1.0 lb (0.5 kg)
		Approvals	RoHS
		Warranty	1 year

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OPERATION

Single and Dual UMX Control
The **UMX** can be operated in both a single and dual operating mode. In the single mode, one **UMX** is controlled from a single current/voltage or PWM signal. In the dual mode, two **UMXs** are controlled in sequence, providing up to 16 relay outputs from a single current/voltage or PWM input. This dual **UMX** control is not available with all control sequences. Refer to the control sequences in Tables 2 and 3 for availability. If single UMX control is used, refer to Table 2 for DIP switch settings. For dual **UMX** control, refer to Table 3.

Pulse Width Modulation (PWM)
To control the **UMX** from a PWM signal, put the input selection jumper on the **UMX** in the PW position. Set the operating mode DIP switches (Tables 2 or 3) as required. Refer to the control sequence in Tables 4 through 7 for time base and control sequence information.

Current/Voltage Input (ANA)
The **UMX** can be controlled from a current or voltage input. To operate in this mode, set the input selection jumpers on the **UMX** as shown in Table 1. Set the operating mode DIP switches (See Tables 2 or 3) as required. Refer to the Control Sequence Tables 4 through 7 for time base and control sequence information.

TABLE 1. CURRENT/VOLTAGE INPUT JUMPERS				
Current/Voltage input	0-20 mA	0-5V	0-10V	0-15V
AN	MA	5V	10V	15V

OPERATING MODE (DIP SWITCHES 1, 2, 3, AND 4)

TABLE 2. SINGLE UNIT UMX CONTROL

PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	1	2	3	4
X								0	0	0	1
	X			X		X		0	1	0	0
	X			X			X	0	1	0	1
	X				X	X		0	1	1	0
	X				X		X	0	1	1	1

TABLE 3. DUAL UMX CONTROL

PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	1	2	3	4
X								0	0	1	0
	X							0	0	1	1
	X	X		X		X		1	0	0	0
	X	X		X			X	1	0	0	1
	X	X			X	X		1	0	1	0
	X	X			X		X	1	0	1	1
	X		X	X		X		1	1	0	0
	X		X	X			X	1	1	0	1
	X		X		X	X		1	1	1	0
	X		X		X		X	1	1	1	1

PWM — Pulse-Width-Modulated Input Signal
ANA — Current/Voltage Input Signal
L1 — Level 1 UMX (Dual UMX Mode)
L2 — Level 2 UMX (Dual UMX Mode)
HSL — Hold Outputs on Signal Loss (Current/Voltage)
CSL — Clear Outputs on Signal Loss (Current/Voltage)
SVT — Short Signal Validation Time (Current/Voltage)
LVT — Long Signal Validation Time (Current/Voltage)

DIP Switches
0 — Off
1 — On

L1, L2 - UMX Levels - Dual UMX Mode Only
In the **Dual UMX** mode, two **UMXs** respond in sequence to a single input signal. Using the DIP switch settings shown in Table 3, assign the first **UMX** to Level 1 (L1) and the second **UMX** to Level 2 (L2). **Dual UMX** control is available in most current/voltage and PWM modes. PWM time base doubles in **Dual UMX** mode.

HSL, CSL - Signal Loss Hold - Current/Voltage Input Mode Only
When using a current/voltage input, the **UMX** can be programmed to either hold all relays in their current state (HSL) or turn all relays off (CSL) upon a loss of the input signal. Use DIP switch settings shown in Table 2 or Table 3 to program this feature.

SVT, LVT - Signal Validation Time - Current/Voltage Input Mode Only
When varying a current/voltage input signal to the **UMX** it is necessary for the input to remain at the desired value for a set length of time. This prevents other relays on the **UMX** from energizing while the input signal is changing values. This set length of time, or validation time, can be selected for either one (1) second (SVT) or three (3) seconds (LVT). Use the DIP switch settings in Table 2 or 3 to select the validation time.
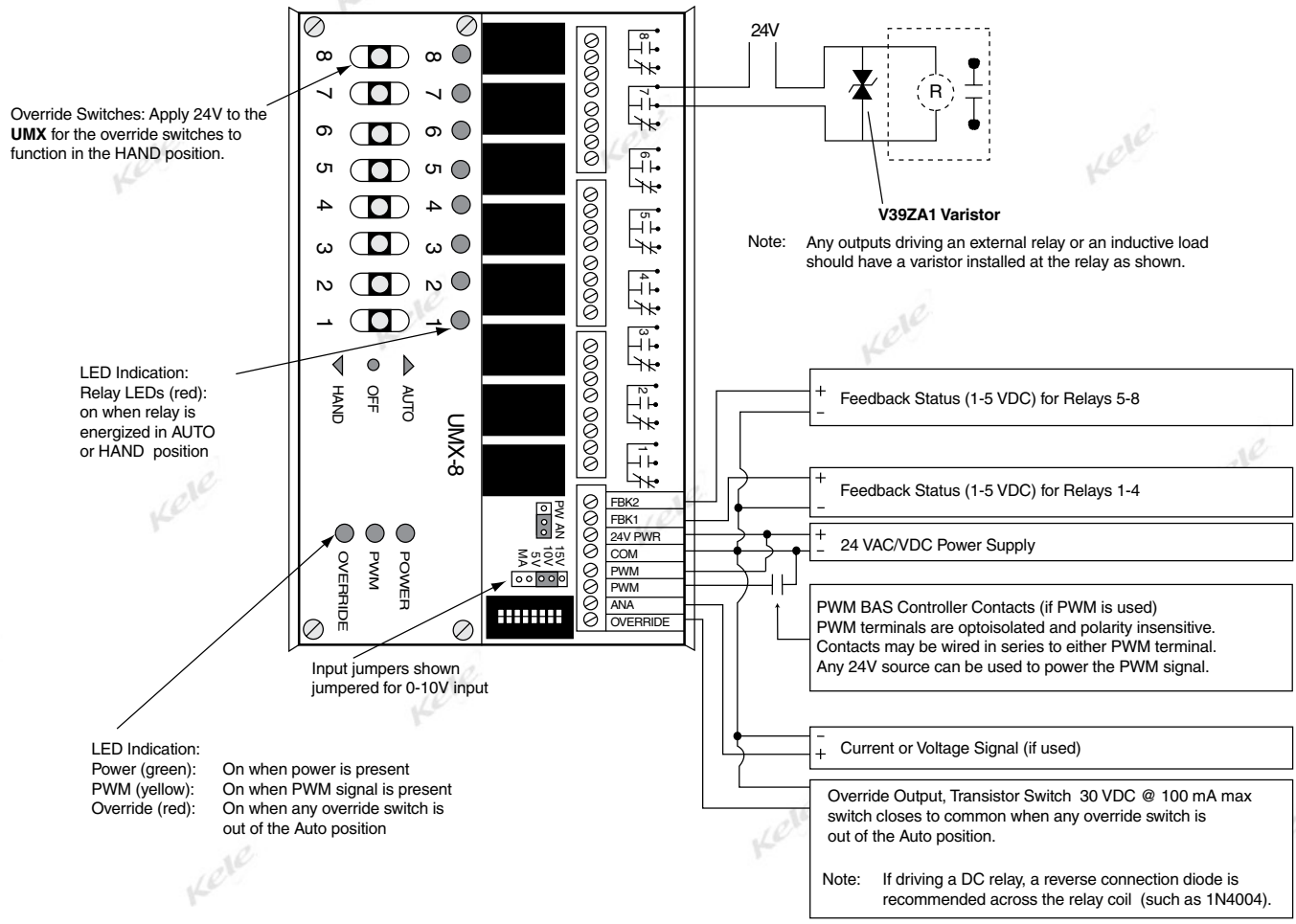
CONTROL SEQUENCES (DIP SWITCHES 5, 6, 7, AND 8)

Relay status
0 = Command OFF
1 = Command ON
X = No change of state

DISCRETE CURRENT AND VOLTAGE COMMANDS
Note: Each input command may vary to approximately 50% of the change to the next highest or lowest command and still be considered valid.

PWM (SEC) 200 mSec Minimum Delay Between Pulses

SINGLE* UMX RELAYS (UMX-8 / UMX-4)

TABLE 4. OUTPUT EXPANDER (each relay independently controllable)

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, OFF, ON, OFF.

For PWM signal, use OFF, OFF, OFF, OFF.

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	4	3	2	1
3.5	0.75	1.50	2.25	0.5	0	0	0	0	0	0	0	0
4.0	1.00	2.00	3.00	1.0	X	X	X	X	X	X	X	1
5.0	1.25	2.50	3.75	1.5	X	X	X	X	X	X	X	0
6.0	1.50	3.00	4.50	2.0	X	X	X	X	X	X	1	X
7.0	1.75	3.50	5.25	2.5	X	X	X	X	X	X	0	X
8.0	2.00	4.00	6.00	3.0	X	X	X	X	X	1	X	X
9.0	2.25	4.50	6.75	3.5	X	X	X	X	X	0	X	X
10.0	2.50	5.00	7.50	4.0	X	X	X	X	1	X	X	X
11.0	2.75	5.50	8.25	4.5	X	X	X	X	0	X	X	X
12.0	3.00	6.00	9.00	5.0	X	X	X	1	X	X	X	X
13.0	3.25	6.50	9.75	5.5	X	X	X	0	X	X	X	X
14.0	3.50	7.00	10.50	6.0	X	X	1	X	X	X	X	X
15.0	3.75	7.50	11.25	6.5	X	X	0	X	X	X	X	X
16.0	4.00	8.00	12.00	7.0	X	1	X	X	X	X	X	X
17.0	4.25	8.50	12.75	7.5	X	0	X	X	X	X	X	X
18.0	4.50	9.00	13.50	8.0	1	X	X	X	X	X	X	X
19.0	4.75	9.50	14.25	8.5	0	X	X	X	X	X	X	X
20.0	5.00	10.00	15.00	9.0	1	1	1	1	1	1	1	1

*Dual **UMX** control available in PWM mode only. PWM time base doubles in "Dual **UMX**" mode.

TABLE 5. 4 or 8 INPUT EXPANDER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, OFF, ON .
For PWM signal, use OFF, OFF, ON, ON.

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	4	3	2	1
4.0	1.00	2.00	3.00	--	0	0	0	0	0	0	0	0
6.0	1.50	3.00	4.50	1.0	0	0	0	0	0	0	0	1
8.0	2.00	4.00	6.00	2.0	0	0	0	0	0	0	1	0
10.0	2.50	5.00	7.50	3.0	0	0	0	0	0	1	0	0
12.0	3.00	6.00	9.00	4.0	0	0	0	0	1	0	0	0
14.0	3.50	7.00	10.50	5.0	0	0	0	1	0	0	0	0
16.0	4.00	8.00	12.00	6.0	0	0	1	0	0	0	0	0
18.0	4.50	9.00	13.50	7.0	0	1	0	0	0	0	0	0
20.0	5.00	10.00	15.00	8.0	1	0	0	0	0	0	0	0

*Dual **UMX** control available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

TABLE 6. 4 or 8 STAGE SEQUENCER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, OFF, OFF.
For PWM signal, use OFF, OFF, ON, OFF.
Note: for adjustable thresholds, use **UCS Series**

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	4	3	2	1
4.0	1.00	2.00	3.00	0.5	0	0	0	0	0	0	0	0
6.0	1.50	3.00	4.50	1.0	0	0	0	0	0	0	0	1
8.0	2.00	4.00	6.00	2.0	0	0	0	0	0	0	1	1
10.0	2.50	5.00	7.50	3.0	0	0	0	0	0	1	1	1
12.0	3.00	6.00	9.00	4.0	0	0	0	0	1	1	1	1
14.0	3.50	7.00	10.50	5.0	0	0	0	1	1	1	1	1
16.0	4.00	8.00	12.00	6.0	0	0	1	1	1	1	1	1
18.0	4.50	9.00	13.50	7.0	0	1	1	1	1	1	1	1
20.0	5.00	10.00	15.00	8.0	1	1	1	1	1	1	1	1

*Dual **UMX** control available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

TABLE 7. RTU CONTROLLER 3 HEAT, 3 COOL, FAN, ECONOMIZER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, ON, OFF
For PWM signal, use OFF, ON, OFF, OFF.

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	4	3	2	1
4.0	1.00	2.00	3.00	1.0	0	0	0	0	0	0	0	0
6.0	1.50	3.00	4.50	2.0	0	0	0	0	0	0	0	1
8.0	2.00	4.00	6.00	3.0	0	0	0	0	0	0	1	1
10.0	2.50	5.00	7.50	4.0	0	0	0	0	0	1	1	1
12.0	3.00	6.00	9.00	5.0	0	0	0	0	1	1	1	1
14.0	3.50	7.00	10.50	6.0	0	0	0	1	0	0	0	1
16.0	4.00	8.00	12.00	7.0	0	0	1	1	0	0	0	1
18.0	4.50	9.00	13.50	8.0	0	1	1	1	0	0	0	1
20.0	5.00	10.00	15.00	9.0	1	0	0	0	0	0	0	1

*Dual **UMX** control available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

TRANSDUCERS

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MULTI-FUNCTION INPUT / OUTPUT EXPANDER
UMX-4, UMX-8

WIRING

Override Switches: Apply 24V to the **UMX** for the override switches to function in the HAND position.

LED Indication:
Relay LEDs (red): on when relay is energized in AUTO or HAND position

LED Indication:
Power (green): On when power is present
PWM (yellow): On when PWM signal is present
Override (red): On when any override switch is out of the Auto position

Input jumpers shown jumpered for 0-10V input

V39ZA1 Varistor

Note: Any outputs driving an external relay or an inductive load should have a varistor installed at the relay as shown.

Feedback Status (1-5 VDC) for Relays 5-8

Feedback Status (1-5 VDC) for Relays 1-4

24 VAC/VDC Power Supply

PWM BAS Controller Contacts (if PWM is used) PWM terminals are optoisolated and polarity insensitive. Contacts may be wired in series to either PWM terminal. Any 24V source can be used to power the PWM signal.

Current or Voltage Signal (if used)

Override Output, Transistor Switch 30 VDC @ 100 mA max switch closes to common when any override switch is out of the Auto position.

Note: If driving a DC relay, a reverse connection diode is recommended across the relay coil (such as 1N4004).

FEEDBACK

The **UMX-8** has two feedback voltage output circuits labeled FBK1 (relay outputs 1-4) and FBK2 (relay outputs 5-8). The **UMX-4** has one feedback voltage output circuit labeled FBK1 (releay outputs 1-4). When a relay output is energized, the following voltage is added to the feedback output:

FBK1 - Feedback Circuit #1			FBK2 - Feedback Circuit #2		
Relays 1,2,3,4	Off	1.0V	Relays 5,6,7,8	Off	1.0V
Relay 1	On	Add 0.27V	Relay 5	On	Add 0.27V
Relay 2	On	Add 0.53V	Relay 6	On	Add 0.53V
Relay 3	On	Add 1.07V	Relay 7	On	Add 1.07V
Relay 4	On	Add 2.13V	Relay 8	On	Add 2.13V

Example: If outputs 1 and 3 are energized and 2 and 4 are de-energized, the voltage output on FBK1 will be 2.34V (1V + 0.27V +1.07V = 2.34V). The same would be true for FBK2 if relay outputs 5 and 7 were energized, and 6 and 8 were de-energized.

ORDERING INFORMATION

MODEL	DESCRIPTION
UMX-4	Four stage multifunction expander with HOA switches
UMX-8	Eight-stage multifunction expander with HOA switches